

REMARKS

Review and reconsideration on the merits are requested.

With respect to the amendments to the claims, claim 1 is amended in a manner to avoid the rejection under 35 U.S.C. § 112, first paragraph.

Claim 2 is canceled. Claims 3-6 have been canceled. Claims 7-18 are canceled. New claims are added. Claim 19 corresponds to a combination of claim 1 and claim 7 rewritten in independent form. Claims 20 and 21 correspond to old claim 2 depending from claims 1 and 19. Claims 22 and 23 correspond to old claim 9 depending from claims 1 or 19. Claim 24 represents a combination of claims 1, 11 and 15 written in independent form. Claim 25 corresponds to old claim 17 depending from claim 24.

Basis is as follows.

In claim 1, “wherein a cushioning member is interposed between a pressing surface of said pressing magnet jig and outside surfaces of the mated portions of said non-magnetic members so as to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet by disposing said cushioning member on one side of said mated portions of said non-magnetic members.” Finds support at page 6, lines 22-24; page 7, lines 15-24; and Figs. 1 and 2 of the specification.

In claim 19, --wherein a thermosetting temperature of said adhesive sheet is in a range of 100°C to 130°C, and a heat resistance temperature of said magnet is not less than 130°C.-- Finds support at page 7, lines 3-5; and page 8, lines 17-20 of the specification.

Limits of other claims are found in original claims.

Applicants now address the rejection under 35 U.S.C. § 112, first paragraph, noting that most of the rejected claims have been canceled.

Applicants respectfully submit that by adding to claim 1 the “to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet” and “by disposing said cushioning member on one side of said mated portions of said non-magnetic members” changes the objected to language in the claims (to put the bonding surfaces in uniform contact with said adhesive sheet) in such a manner that the limit to claim 1 (and the corresponding limit in other claims) as now presented finds basis in the specification at the points above referenced for claim 1.

Applicants respectfully submit that if one reads page 6, lines 23/24 in combination with page 7, line 20, one of ordinary skill in the art would see Applicants were in possession of the invention where the one or more cushioning members improved the conformability of jig 1 to the shape of the portion to be bonded, which would teach one of ordinary skill in the art that Applicants were in possession of the invention where the cushioning members affect the bonding surfaces to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet. Applicants go further, however, and in light of the portions of the specification discussed as supporting claim 1, Applicants respectfully submit that claim 1 as currently amended finds full support in the specification and request withdrawal of the rejection under 35 U.S.C. § 112, first paragraph.

If the Examiner remains unconvinced, the Examiner is requested to contact the undersigned by telephone so that a telephone interview may be arranged concerning this particular issue.

Applicants now address the art rejections.

Prior art considered: U.S. Patent 2,713,379 Sisson (Sisson); U.S. Patent 2,519,107 Brown (Brown); the admitted prior art (the specification pages 1 and 2, which I refer to as admitted prior art).

Applicants first address the rejection of Paragraph 6 of the Action under 35 U.S.C. § 103(a) over Sisson in view of Brown.

They would traverse the rejection as follows.

Since claims 2, 9, 11, 13, 15 and 17 have been canceled. The claims to be examined are amended claim 1 and new claims 19 and 24, each including the amended claim 1, with new claims 20 and 21 (instant claim 2) and 22 and 25 (instant claim 9), each dependent from the amended claim 1 or new claim 19 (consisting of the amended claim 1 and instant claim 7), and new claim 25 (instant claim 17) dependent from new claim 24 (consisting of the amended claim 1 and instant claims 11 and 15).

If the Examiner will refer to claim 1 as currently amended, the Examiner will see that distinguishing features of the claimed invention are as follows:

a cushioning member is interposed between a pressing surface of the pressing magnet jig and outside surfaces of the mated portions of the non-magnetic members so as to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet by disposing one or more of the cushioning members on one side of the mated portions of the non-magnetic members (emphasis added) such as mated portions of the half-cylindrical skin members. As a result, the one or more cushioning members as such facilitate detachment of the pressing magnet jig 1 from the bonded members and improve the conformability of the pressing jig 1 to the shape of the portion to be bonded (see page 7, lines 19-24 of the specification). This makes it possible not only to appropriately select a pressure in a range from 0.025 kg/cm^2 to 0.8 kg/cm^2 for the magnetic force of the magnet in bonding the non-magnetic members, such as half-cylindrical skin members made of a fiber-reinforced composite material which constitute the fuselage of air craft, but also to improve workability in the use of the pressing magnet jig and the pressure-

receiving, soft magnetic jig (see page 3, lines 9-11; and page 6, lines 6-15; page 6, line 19 to page 7, line 1 of the specification).

In contrast to amended claim 1, although Sisson teaches a method for bonding together overlapping portions of strips by placing the mated portion of the strips (via a bonding film) between a pressing magnet jig and a pressure-receiving soft magnetic jig (see col. 1, lines 15-19, col. 2, lines 21-24, lines 44-50 and Fig. 2 of Sisson), Sisson fails to teach or suggest the use of one or more cushioning members interposed between a pressing surface of a pressing magnet jig and the outside surfaces of the mated portions of the non-magnetic to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet by disposing the one or more cushioning members on one side of the mated portions of the non-magnetic members.

Applicants respectfully submit, that one of ordinary skill in the art, referring to Sisson, which is completely silent regarding the use of a cushioning member, would not be motivated to reach the invention as recited in claim 1. Thus, clearly claim 1 is not obvious over Sisson.

However, the rejection is a combination rejection, and Applicants now turn to the secondary reference, Brown, to see if Brown remedies the defects of Sisson.

Applicants wish to emphasize that the cushioning device of Brown as shown in Fig. 1 consists of pad 17 positioned adjacent the outboard mounting board motor engaging surfaces 13 of stationary jaw 12 and pad 18 positioned on the movable jaw or clamping head 14 (see col. 2, lines 8-19; and Fig. 1) and these pads in the Brown cushioning device are formed from any suitable material possessing resilient characteristics, such as synthetic rubber, Neoprene, or the like (see col. 2, lines 13-15). As a consequence, during the use of the cushioning device of Brown pads 17 and 18 contact the surfaces of the outboard motor mounting board on which the bracket 10 is positioned, so that the surfaces are effectively protected from scratching, and the like (see col. 2, lines 32-37; and Fig. 1 of Brown).

The effect of the cushioning device of Brown shown in Fig. 3 which consists of a pair of resilient pads 26 secured by an adhesive to opposed faces 27 of the clamping jaws 28 is the same as in the case of Fig. 1 in protecting both surfaces of two pieces of woods held together during fabrication (see col. 2, lines 38-49; and Fig. 3).

It is thus quite clear that the cushioning device of Brown is directed to preventing both surfaces of the work to which the clamps are attached from becoming scratched, deformed, or otherwise damaged.

In contrast to Brown, the cushioning member of the present application is interposed between a pressing surface of a pressing magnet jig and the outside surfaces of mated portions of the non-magnetic members so to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet by being disposed on one side of the mated portions of the half-cylindrical skin members. This is done by selecting a pressure in the range of from 0.025 kg/cm² to 0.8 kg/cm² for the magnetic force of the magnet, thereby achieving sufficient bonding strength and also improving workability in use of the pressing magnet jig and the pressure-receiving, soft magnetic jig (emphasis added; see page 3, lines 14-17; page 6, lines 6-15; page 6, line 19 to page 7, line 1; and page 7, lines 19-24 of the specification).

Brown quite clearly fails to teach or suggest any cushioning member disposed on one side of the mated portions of the non-magnet members which are nonetheless interposed between a pressing surface of the pressing magnet jig and the outside surfaces of the mated portions of non-magnetic members to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet. Thus, clearly Brown standing alone does not render the invention of claim 1 obvious.

Addressing the combination of Sisson and Brown, Applicants respectfully submit that the combination of Sisson and Brown fails to teach or suggest a cushioning member interposed

between a pressing surface of a pressing magnetic jig and outside surfaces of mated portions of nonmagnetic members so as to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet by disposing the one or more cushioning members on one side of the mated portions of the non-magnetic members. Accordingly, since the combination of Sisson and Brown does not suggest the totality of the limits just discussed, withdrawal of the rejection over Sisson in view of Brown is requested.

While Applicants believe the patentability of the other newly added claims is clear from the above discussion, they do offer some additional comments.

Applicants would like to add some comments on new claim 22 which recite “wherein an applying pressure for curing is in the range of 0.025 kg/cm² to 0.8 kg/cm², and wherein a thermosetting temperature of said adhesive sheet is in a range of 100°C to 130 °C and a heat resistance temperature of said magnet is not less than 130°C.”

The Examiner states in Paragraph 6, lines 14-21 of the Action that:

“As to the cushioning members putting the bonding surfaces of the non-metallic materials into uniform contact with the adhesive layer, it is noted Sisson as modified by Brown teaches applying a constant pressure to the mated portion of the two parts wherein the pressing magnet jig has a cushioning layer formed of synthetic rubber placed over the parts of the jig in contact with the mated portion such that the pressure applied by the pressing magnet jig with cushioning members is a constant/uniform pressure over the entire length of the mated portion which would result in the claimed uniform contact of the non-metallic materials with the adhesive layer.”

However, it is quite clear from the foregoing discussion that Sisson is silent regarding the use of a cushioning member disposed on one side of the mated portions of the half-cylindrical skin members and yet interposed between a pressing surface of the pressing magnet jig and the outside surfaces of the mated portions of non-magnetic members to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet.

Further, in the magnetic device of Sisson which is directed to clamping overlapping parts during adhesive bonding, a constant squeezing force of about 30 pounds per square inch (=2.17

kgf/cm²) of permanent magnet area is applied (see col. 2, lines 60-67 of Sisson). This constant pressure is too high to use in the present invention as the curing pressure.

Thus, in contrast to Sisson, in accordance with the present invention, pressure is applied to the mated portions between a pressing magnet jig and a pressure receiving, soft-magnetic jig, while curing is conducted in a pressure range of from 0.025 kg/cm² to 0.8 kg/cm². This is quite an important parameter since if the pressure is less than 0.025 kg/cm², the bonding force becomes too small because the bonding surfaces are not put into uniform contact with the adhesive sheet, resulting in the likelihood that pressing magnet jig 1 and pressure-receiving, soft-magnetic jig 7 may be detached by their own weight. Although the upper limit of pressure is not restrictive, a pressure larger than 0.8 kg/cm² makes it difficult to detach the jigs, while not providing any meaningful increase in bonding strength. Clearly, there is nothing in Sisson which would suggest the pressure range of from 0.025 kg/cm² to 0.8 kg/cm². Therefore, a constant pressure of 2.17kgf/cm² applied in the magnetic device of Sisson falls outside the range of 0.025-0.8 kg/cm².

Of course neither Sisson nor Brown teaches a curing temperature, while in the present invention (as shown in Fig. 2) the thermosetting adhesive sheet 5 is heated to a temperature necessary for curing while applying pressure to the mated portions.

The temperature is an important aspect of the present invention. This is because local heating of the mated portions may result in breakage of the fiber-reinforced composite members or their mated portions by thermal expansion in some cases. Thus, it is preferable to uniformly heat the entire fiber-reinforced composite members using an uniform temperature. In the case of using a thermosetting adhesive, it is usually preferable that the heat resistance temperature of the magnet be not less than 130°C. The heating temperature need only be lower than the heat resistance temperature of the magnet but high enough to thermally cure the adhesive sheet,

though it preferably ranges from 100°C to 130°C. If the heating temperature is lower than 110°C, curing the adhesive sheet is not complete, which will fail to produce sufficient bonding strength. The bonding surfaces need only be heated while applying pressure for a time necessary to fully cure the adhesive to a sufficient bonding strength, though it is preferable to keep the bonding surfaces at the heating temperature for about 60 minutes. In the case of large fiber-reinforced composite members, heating and cooling may be carried out at a constant speed of 2-4°C/minute (see page 7, lines 3-5; page 8, lines 10-28 of the specification).

Considering the above, Applicants respectfully submit that one of ordinary skill in the art, referring to Sisson and Brown, alone or in combination, would not be motivated to reach the claimed curing conditions of claim 24 such that the overall combination of the following limits is taught to one of ordinary skill in the art:

Curing pressure of 0.025-0.8 kg/cm²;

thermosetting temperature of the adhesive sheet is in the range of 100°C to 130°C; and

the heat resistance temperature of the magnet is not less than 130°C.

The combination of the above limits is, Applicants submit, nowhere suggested in the prior art.

Applicants now address the rejection of Paragraph 7 of the Action, where claim 7, among a number of claims, was rejected under 35 U.S.C. § 103(a) as being unpatentable over Sisson in view of the admitted prior art or, alternatively, the admitted prior art in view of Sisson. The above rejection would seem to apply to present claim 19.

Major distinguishing features of claim 19 are as follows:

A pair of non-magnetic members are bonded together where the non-magnetic members are half-cylindrical skin members made of a fiber-reinforced composite material for constituting a fuselage of an aircraft. This is to reduce the weight of transport vehicles (including aircraft) by

carrying out curing of the adhesive while applying pressure using a cushioning member disposed on one side of the mated portions of the half-cylindrical skin members as the non-magnetic members. However, the cushioning member is interposed between a pressing surface of the pressing magnet jig and the outside surfaces of the mated portions of the half-cylindrical skin members as the non-magnetic members so as to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet (see page 3, lines 14-17; page 6, lines 22-24; page 7, lines 19-24; and Figs. 1 and 2 of the specification).

The Examiner states in the paragraph bridging pages 6/7 of the Action that:

“It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the magnetic jig taught by Sisson to bond any two parts such as parts made of fiber-reinforced composite material useful for making an aircraft fuselage (i.e., half-cylindrical skin members) as it was known in the art to bond these parts using a jig as shown by the admitted prior art and only the expected results would be achieved, i.e., bonding without having to form through-holes through the parts. Alternately, it would have been obvious to one of ordinary skill in the art at the time the invention was made to bond the two parts taught by the admitted prior art using a magnetic jig such as the magnetic jig shown for example by Sisson as it was well known in the art to bond any two parts using a magnetic jig and only the expected results would be achieved, i.e., bonding without having to form through-holes through the materials.”

Applicants submit the Examiner’s reasoning to be flawed as now explained. First, Sisson ignores a feature such that a pair of non-magnetic members are bonded together and that the non-magnetic members are half-cylindrical skin members made of a fiber-reinforced composite material for constituting a fuselage of aircraft so as to reduce the weight of transport vehicles (including aircraft) as disclosed in the present application.

Second, Sisson not only is silent regarding the use of any cushioning member interposed between a pressing surface of a pressing magnet jig and outside surfaces of the mated portions of the non-magnetic members so as to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet by disposing the one or more cushioning members on one side of the mated portions of the half-cylindrical skin members as the non-magnetic members but also fails

to teach a suitable curing pressure and an appropriate temperature to carrying out the curing of the adhesive sheet completely.

With respect to the admitted state of the prior art, Applicants respectfully submit that the Examiner has extended the teaching in the specification regarding the admitted state of the prior art far beyond what the specification actually attaches to the admitted state of the prior art. In more detail, the admitted prior art fails to teach or suggest not only a pair of half-cylindrical skin members made of a fiber-reinforced composite material as the non-magnetic members for constituting a fuselage of aircraft so as to reduce the weight of transport vehicles (including aircraft) but also fails to teach the use of any cushioning member so as to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet by disposing the one or more of the cushioning members on one side of the mated portions of the half-cylindrical skin members as the non-magnetic members.

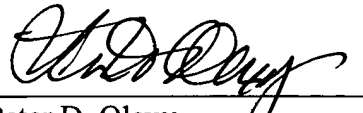
Quite clearly, one of ordinary skill in the art referring to the admitted prior art in the specification would not reach the invention recited in claim 19. Accordingly, Applicants submit that claim 19 is clearly patentable over Sisson in view of the admitted prior art or the admitted prior art in view of Sisson.

As discussed above, neither Sisson nor the admitted prior art in the specification teaches or suggests a pair of half-cylindrical skin members made of a fiber-reinforced composite material would in any fashion be useful as the non-magnetic members to constitute the fuselage of an aircraft so as to reduce the weight of transport vehicles, (including aircraft), nor do Sisson and the admitted state of the prior art teach the use of any cushioning members so that one proceed to subject the whole bonding surfaces to contacting uniformly with said adhesive sheet by disposing the one or more cushioning members on one surface of the half-cylindrical skin

Amendment Under 37 C.F.R. § 1.111
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